

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.



DUST STORMS

COME FROM
THE POORER LANDS

LEAFLET NO. 260
U. S. DEPARTMENT OF AGRICULTURE

DUST STORMS COME FROM THE POORER LANDS

By H. H. FINNELL, *Research Specialist, Soil Conservation Service, Goodwell, Okla.*

Abandoned land is usually a sign of failure; either land has failed or a farmer has failed. A good deal of the land lay out, unused and uncovered, during the 1930's on the High Plains of Colorado, Kansas, and Oklahoma. But much of this land was put back into crops when the favorable weather and high prices came along in the 1940's. In fact, prices were so good that many Plains farmers and ranchers began to look around for new land to plow. Quite a few small pastures and stomp lots were plowed up for crops and even some of the larger pastures.

Altogether, some 2 million acres of virgin sod were plowed up in the Southern Great Plains from 1941 to 1948. Much of this newly plowed range and pasture land is poor land; the soil is shallow or very sandy, the slopes are relatively steep and much of it is toward the western edge of the old Dust Bowl—where normal rainfall is less than 16 inches annually.

The Soil Conservation Service undertook a study, in 1947, to determine what the results of plowing such land have been in the past and what we may expect from such land in the future. These studies were made on 2,347,000 acres of land in 7 counties in the heart of the old Dust Bowl in Colorado, Oklahoma, and Kansas. SCS had made a similar study of these same areas in 1936; hence it was able to compare the land conditions of the two periods and determine what changes had taken place during the 11 years.

The first thing we found out in this study was that there was not just one cause of land failure. Much of the land was idle because farmers went broke and left the country. The combination of crop failures and low prices had forced them to abandon the land, even though erosion had not seriously damaged its productivity. Most of this land has been put back into cultivation during the 1940's.

But, we found some land that apparently had been abandoned mainly because erosion made it unproductive. Most of this land is still lying idle or is now being used for pasture.

In this study, we placed all of the formerly abandoned land in one of two broad classes: (1) Land that was abandoned mainly because of financial failure of the farmer, and (2) land that was abandoned mainly because of physical land failure. It is the land of the second class with which we are mainly concerned here.

The most important thing we found out in this study about land failure was that most of the land that failed was poor land at the time it was first placed in cultivation. Likewise, we found that most of the abandoned land which was later reclaimed was a better class of land to start with. In other words, most of the dust storms of the thirties came from the poorer land. While some of the better land was abandoned during the 1930's and did blow to some extent, it was usually not severely and permanently damaged and was later reclaimed and placed back in cultivation.

Classes of Land on the Plains

The soil conservationist grades land according to how much care it needs to keep it producing. Class I land is the good, deep, level land that you can farm without special practices to hold the soil against washing or blowing. Class II land is not quite so good. It needs simple care to save it from erosion and keep it productive (fig. 1). Class III land can



Figure 1.—When soil moisture is insufficient to bring up a crop, wind erosion like this takes place. Removal of topsoil in these fields in Kit Carson County, Colo., means that Class II land will rapidly decline to Class III unless corrective steps are taken. (Picture taken April 1947.)

be used safely for crops but is rather difficult to farm. In the Plains it may be uneven or may be in a zone of not quite adequate rainfall. Such land must have a number of well-chosen practices to grow crops and keep the soil in place (fig. 2). Stubble-mulch tillage should be used on all cropland in the Plains, and crop residue should be returned to the land.

Class IV land needs extremely good care if used for crops. It is "in between" the land suited for regular cultivation and the land that should never be plowed. In this section it may pay well to farm it when it is new, the seasons are good, and the prices high; but it goes down fast under cultivation. Run-down land easily gets out of control in bad blow areas and may be severely damaged unless it is given a rest under sod every so often.

Four more classes of land are not suited for any cultivation. Some people have tried farming land in these classes, but with bad results. Such land breaks down so fast it can hardly ever be reclaimed and made as good again as before.

Poor Land Wears Out Fast

To get a fair measure of how well different kinds of land in the Plains stand up under cultivation, we studied the amount of each kind that was abandoned and the speed with which it was damaged by erosion.

The deep flat hard land where most of the wheat is grown stands up best. Less than 1 acre out of 20 of those broken out since farming started on the Plains is seriously damaged or is likely to be abandoned because of soil

erosion. Only simple care is needed to keep such land from blowing; so we call it Class II land.

Deep flat mixed land (moderately sandy) has just as good a record under cultivation as the hard land where the normal yearly rainfall is 18 inches or more. But about 1 acre out of 10 went to the bad where the rainfall drops to 16 to 18 inches annually. And where the normal rainfall is only 14 to 16 inches, more than 1 acre out of 4 was lost.

From these facts we rule that: Deep flat mixed land is Class II land where the rainfall is more than 18 inches, is Class III land where rainfall is between 16 and 18 inches, and is not capable of being cultivated where the rainfall is less than 16 inches.

Flat medium-depth hard land was shown to be Class II land where 18 to 20 inches of rain falls on the average each year. But where the rainfall is less, this land is suited for growing crops of grain for only short periods. To prevent severe wind erosion and keep up fertility, this Class IV land needs to go back to grass after a few years of cultivation. And it should be kept in grass at least half the time. These periods under grass might be called rest periods, but they ought to be more than that for best results. A soil-building crop such as sweetclover mixed in the grass will hasten the comeback.

Similar land (medium-depth hard land) on slopes of 2 to 5 percent, however, is Class IV anywhere in the Plains. Moreover, we found that wear and tear on such land is greatest where wind and water erosion overlap; that is, in the 16- to 18-inch rainfall zone.

Sandy land takes up moisture faster than the hard land. This makes it less droughty and allows less runoff to cause washing. But sand is very shifty in the wind and sandy land will blow out deeper than hard land. As a result, sandy land goes bad much more quickly than hard land when allowed to blow at all.

We found that 25 to 45 percent of all the sandy land that had been put in cultivation in the High Plains is already abandoned or just about to be. This takes in both the nearly level and the gently sloping sandy soils.

Only one soil is less capable of being kept a long time in cultivation than sandy soil. That is shallow soil, light or heavy, flat or sloping. It is also less desirable because it makes poorer yields from the start.

In terms of how fast land tends to wear out, we found that the land classes rate pretty much as follows: About 1 acre out of 40 of Class II land has been going to the bad every 22 years. Under average farm conditions, Class III cropland is being put out of use four times as fast as Class II land. Finally, Class IV land is being ruined nearly seven times as fast as that in the Class II.

Past experience, after all, is the best guide we have by which to look forward. It helps us to decide where we should place our strongest efforts to offset the tendency of lands to wear out.

Traveling Soils

Most sandy soil when blown off collects nearby because large particles travel near the ground. On the other hand, hard-land soil (clay soil) when blown by wind makes a fine dust. The dust goes high into the air and is usually carried long distances.

This difference in manner of soil blowing was shown by the area of hummocks and drifts as compared with the area of blow-outs. For each acre of piled-up drifts and hummocks on sandy land there were from 3 to 6



Figure 2.—Sandy row-crop land, Classes III and IV, depend much on crop management for erosion control. A, Bundle feed cut with enough stubble left for protection; B, bundle feed cut too short; C, long stubble was left but the stand was too thin; D, broom corn usually furnishes enough cover.

acres of blow-out, whereas on hard land there were from 15 to 25 acres.

Thus the fine dust lost out of your field does not benefit your neighbor. It goes so far and is scattered so widely it is doubtful that it benefits anybody.

Slope and Rainfall

Another thing we found out is that gently sloping land tends to wear out $2\frac{1}{2}$ times as fast under an average of 17 inches of rainfall as similar land lying nearly flat. Under 20 inches of rain they go 16 times as fast.

The problem of water erosion is becoming more acute on the Plains. This is because much of the new land plowed up in recent years is sloping, whereas of all the land plowed before 1936, 6 acres out of 7 was flat land.

This is an example of how we make our land problems tougher by ignoring the lessons of experience and by taking long chances in choosing the uses for our land.

As has been mentioned, wear and tear on medium-depth hard land is greatest where wind and water erosion overlap. But over-all wear and tear owing to erosion by wind and water combined increased as we went west; from 11 percent at 19 inches of rainfall, to 16 percent under 17 inches of rain, and to 25 percent at 15 inches.

What's Our Newly Plowed Land Like?

What kind of land are we now breaking out on the High Plains? In the seven counties we examined and classed 259,000 acres of newly plowed land. Twenty-one percent was found to be Class II land, 6 percent was Class III land, and 48 percent was Class IV land. And 25 percent was entirely unsuited for cropland.

This means that we are likely to have a great deal of trouble with this newly plowed land in the future.

The Danger in Plowing Class IV Land

Another problem which is becoming more important each year is that of managing the Class IV land. A larger acreage of this "in-between" land is being put in cultivation each year.

The danger in plowing up this kind of land lies in the fact that it is so hard to tell when to stop cultivating it and put it back to grass. Moreover, the grass must have moisture to get started. And if there is enough moisture in the soil to bring up a crop, most farmers want to plant wheat.

The really wise farmer, no doubt, is the one who does not put any low-grade land in cultivation at all. But if you must stretch the use of your land a little you ought to make some very careful plans.

First, have a common-sense scientific survey made of your land and have it rated according to its capability. And never put anything poorer than Class IV land in cultivation.

Second, when you *do* cultivate Class IV land, take care to return all trash to the land each year, to sow it down again to grass in time, and, where possible, to sow a grass-sweetclover mixture. The soil-building crops with a rest period are needed to restore fertility and build back the soil structure after each period of a few years of cultivation.

Erosion Results in Low Yields, Abandoned Land, and Dust Storms

Ignoring the natural risks in cropping poor land has brought about a great deal of land failure. An idle field abandoned because of erosion is not a pleasant sight. Weeds and tough woody grasses grow on it for several years before good pasture grasses ever start to come back. Even the shape of the land is often changed by the wind; the drifts and dunes become fixed by the weed cover that takes over. Later, these hummocks may be built higher by soil blown in from nearby fields.

The biggest waste in this neglect of land is the loss of income while the land lies idle. In addition, most dust storms start on abandoned land. But the dust storms and loss of land usefulness that result from land abandonment are by no means all the loss caused by wind erosion. Wind erosion also results in lower yields. Table 1 shows the differences in wheat yields in 1947 on land that was slightly, moderately, and severely eroded by wind back in the 1930's.

TABLE 1.—*Effect of erosion damage, chiefly in the 1930's, on wheat yields in 1947*

Degree of erosion	Wheat yields per acre in 1947 on—		
	Flat deep heavy soils (Class II land)		Rolling shallow heavy soils (Class IV land)
	Summer fallowed	Continuously cropped	Continuously cropped
	<i>Bushels</i>	<i>Bushels</i>	<i>Bushels</i>
Slight.....	45.0	29.0	22.0
Moderate.....	33.0	27.2	15.0
Severe.....	26.2	17.6	13.5

Even where wind erosion is not bad enough to stop cultivation, it is too costly a thing to neglect. Always, it has led to land failure where it was not stopped soon enough. It will pay you to control wind erosion now and save what capability your soil still holds (fig. 3).

The Future of the Plains

The success of farming the Plains both now and in the future rests on putting a stop to land failure.

It takes only three things to prevent most land failure: (1) Good cropland must have the erosion-control practices that fit its needs to keep it from turning into poor land, (2) poor cropland must have the best conservation measures applied from the start to keep it from being lost altogether, (3) land outside the crop classes must not be farmed at all, but kept in grass.



Figure 3.—A, Texans talk a lot about New Mexico blowing over into Texas. This picture was made February 25, 1949, looking south on the State line. B, Across the road on a deeper soil, Class III land was doing better. A fair stand of wheat was holding out in February 1949, and prospects for a successful crop were good.

Issued September 1949.

U. S. GOVERNMENT PRINTING OFFICE: 1949

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C. - Price 5 cents

